REMARKS

Claims 7, 8, 12-17, and 20-28 are all the claims pending in the application. Claim 28 is amended. Claims 7-27 are cancelled. New claims 29-41, which depend from amended claim 28, are added.

Support for Amendment

In amended independent claim 28, the step of inspecting a defect on the main surface is executed after the step of carrying out a precision polishing step which is carried out after the etching step. This is because the etching step isotropically etches a surface of a glass substrate to widen or magnify a crack. However, such a magnified crack would be hidden behind texture irregularities or asperity on the surface and would be often overlooked, as explicitly described on page 27, lines 21 to 26 of the original specification.

This is in contrast to Walker, which teaches an acid surface clearing step which is practiced by simply dipping a ground stock piece surface into a bath of the acid mixture (page 3, right-hand column, lines 14 to 17). As a result, all of the debris matter of the earlier grinding operations has been removed therefrom any relatively deep surface scratches or other mars will now be readily discernible (page 3, right-hand column, lines 31 to 35).

After the acid surface clearing step, the stock piece is inspected to discard the stock piece which contain undesirable imperfections (page 3, right-hand column, lines 35 to 43). If the stock piece withstands inspection at this stage of its manufacture, it may, for example, next be subjected to a fine polishing action (page 3, right-hand column, lines 43 to 46).

Unlike the present invention, Walker is not aware that the etching process makes it difficult to inspect magnified cracks due to the texture irregularities and, therefore, carries out the fine polishing step after the inspection.

Claim Objections

Claims 22 and 23 are objected to because each of claims 22 and 23 recite the limitation of "a mask of producing a glass substrate for a mask blank according to claim 12" in the respective claim preamble. The Examiner notes that Applicant appears to have intended to recite "a method

of producing..." rather than "a mask of producing..." as presently recited and that the present claim language constitutes an inadvertent typographical error.

This objection is moot in view of the cancellation of the claims.

Claim Rejections - 35 USC § 112

Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. This rejection is moot in view of the cancellation of the claim.

Claim 28 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This rejection is traversed for at least the following reasons.

In framing the rejection, the Examiner notes that claim 28 recites the limitation "the defect that is located in a position deeper than the predetermined polishing -off amount and that is elicited by the etching step and remains after the precision polishing step" in lines 14-16. The Examiner finds insufficient antecedent basis for this limitation in the claim.

The basis for this rejection has been corrected in amended claim 28.

Claim Rejections - 35 USC § 103

Claims 7, 8, 12-17, and 20-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walker (US 2,372,536) in view of Feng (US 6,596,042 B1) and Hagihara (US 2001/0051746 Al). This rejection is traversed for at least the following reasons.

Claims 7, 8, 12-17, and 20-27

First, as to claims 7, 8, 12-17, and 20-27, the rejection is moot in view of the cancellation of the claims.

Amended Claim 28

Claim 28, which is directed to a method of producing a glass substrate for a mask blank, has been amended to specify in greater detail the etching, precision polishing and inspecting steps, particularly the inspecting of a crack by using an etching step to magnify "in an in-plane direction, the crack which is left after the precision polishing step."

Walker

Walker discloses inspecting mars and scratches on a surface of a stock piece or glass piece with reference to Figs. 2 to 5. Specifically, a rough grinding process of a stock piece is performed in Fig. 2 so as to bring a contour into approximate conformity with a prescribed final shape. In this event, the ground glass type surface comprises a series of minute cusps 16 and depressions. Side wall portions of the cusps 16 will be found to be coated with debris consisting of fragments of ground glass and abrasive which have been lodged in the surface of as indicated at 18 during the preceding grinding operation. At this stage, it is extremely difficult to properly inspect a stock piece for the presence of relatively deep scratches or marrings or internal inclusions or striae or other imperfections (page 2, right-hand column, lines 46 to 67).

In addition, the fine grinding operation or the polishing operation is performed in Fig. 3 to reduce the coarse cusp and debris and fracture structures of Fig. 2. However, the stock piece has a reduced dimension order, as illustrated by Fig. 3 at the cusps 24, the debris 26, and the sub-surface fractures 28 (page 2, the right-hand column, line 68 to page 3, left-hand column, line 3).

Thereafter, a chemical process is performed, as shown in Fig. 4 to clear away of the debris and the cusps. But, the stock piece surface comprises a series of relatively low domes or wave-like formations indicated at 30 (page 3, right-hand column, lines 20 to 26). At this stage, all of the debris matter of the earlier grinding operations have been removed therefrom any relatively deep surface scratches or other mars will now be readily discernible (page 3, right-hand column, lines 31-35). The stock piece may be discarded at this time if it is found to contain undesirable imperfections (page 3, right-hand column, lines 35 to 42).

Invention Magnifies the Cracks

On the other hand, the present invention etches a surface of a glass substrate and magnifies or widens cracks when the substrate has the cracks in a depth direction. This serves to expand or magnify the cracks in a direction or the surface, namely, an in-plane direction (page 27, lines 21 to 22 of text). In this event, the surface of the glass substrate subjected to the etching process is not always sufficiently flattened but may have irregularities or concavity and convexity. Therefore, when a defect inspection process is performed after the etching process, defects can be readily inspected by magnifying the cracks in the in-plane direction on one hand

but can not be precisely inspected due to presence of the texture irregularities left on the surface (page 27, lines 24 to 26) on the other hand.

Precision Inspection Achieved by Invention

Taking the above into account, the present invention makes it possible to precisely inspect the magnified cracks without any influence of the texture irregularities. This is because the defect inspection process is not performed after the etching process of magnifying the cracks but is performed after the precise polishing process carried out after the etching process.

Thus, the precise polishing process carried out after the etching process serves to flatten the surface of the glass substrate but does not make it difficult to inspect the magnified cracks in the in-plane direction. Thus, the present invention enables to precisely judge whether or not the glass substrate is good.

In marked contrast to the present invention, Walker carries out the inspection process which is carried out after the chemical process, with the series of relatively low domes or wave-like formations (indicated at 30 in Fig. 4) left on the stock piece surface.

Greater Precision is Achieved

The present invention is based on recognition wherein the surface of the glass substrate is not enough to be precisely inspected after the etching process due to the low domes or wave-like formations and flatness. Taking this into account, the present invention performs the defect inspection process after the surface of the glass substrate is subjected to both the etching process and the subsequent precise polishing process.

In consequence, the present invention enables to precisely carry out the inspection as compared with Walker.

Feng, Hagihara and Brown

Inasmuch as none of the cited references disclose the above-mentioned precise inspection and its condition, the present invention is not obvious from the cited references even if they are combined with Walker.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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